

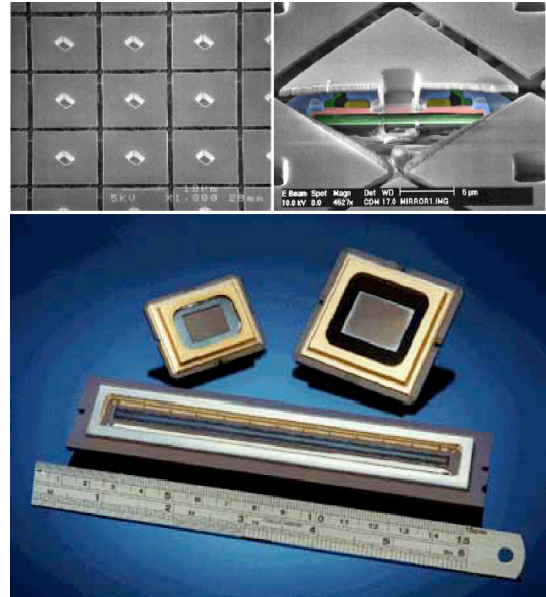
Title: Fundamentals of the DMD™ and a Novel Actuation Method using Capacitors

Speaker: Dr. Jim Huffman, Texas Instruments

Date: 11:00 AM, Friday April 15

Location: Technology Building 225, Room A362

Abstract: The Deformable Micromirror Device, or DMD™, is a MEMS based spatial light modulator that is currently being used in some very interesting projector based applications. Even though the DMD technology was invented in 1987, the first projectors utilizing this technology did not appear on the market until 1996. Since then, DMD has had considerable success in the business projector and large screen television market.



The fundamental building blocks of the DMD are the micromirror and control circuitry. These building blocks enable each micromirror in an array to be individually addressed. The control circuitry under each micromirror consists of an SRAM cell, or static random access memory. The electrostatics provided by the SRAM, as well as the mechanical forces in the micromirror, enable it to rotate about an axis to provide two stable states. In the DLP™ projection system, the two stable states of each micromirror in the array are able to generate video images with excellent clarity and reliability.

In this presentation, I will first outline a short history of the DMD device and the basic development that enabled this successful display product. The next section will outline the fundamental operation of the micromirror and how it can be used to generate a digital representation of a gray scale. I will then describe a novel actuation method using a 1T1C, or one transistor-one capacitor, control circuit and a mirror addressed micromirror. I will focus on the decay of the charge on the capacitor due to photon recombination and the effects on the mechanical performance on the micromirror. The last section will describe techniques used in overcoming the issue of light sensitivity and the results from experimentation.

Bio

Jim Huffman has been working on the DMD since 1995. He is currently a Senior Member of Technical Staff in Technology Development at Texas Instruments. He holds 17 patents in the field of MEMS, Semiconductor Process, and Circuit Design. Jim has a PhD in Solid State Physics from the University of Texas at Dallas, as well as a BS in Electrical Engineering from Texas A&M University.